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B60R 9/042

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B7J J64

(56) Documents Cited
GB 2251837 A **GB 2177055 A** **EP 0287269 A1**
US 5884824 A **US 5850891 A** **US 5398778 A**

(58) Field of Search
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(54) Abstract Title
A rack for transporting elongate objects

(57) A high-roof van (1) with a ladder rack (2) for transportation of a ladder (3) which lies horizontally on top of the roof (4) supported on base (5) which is fixed to the roof (4) and having front and rear cross-bars (6a, 6b). Front cross-bar (6a) has a hook (7) to prevent unauthorised removal of ladder (3).

To remove ladder (3), handle (12) of the rack (2) is pivoted outwards and ratcheted upwards, causing the movable parts of the rack (2) to swing outwards until it reaches the position where it lies against the side of the van (1). The operator then releases a lock (13) which allows post (11) to move vertically downwards relative to the post (10) and hence still supporting ladder (3). The lower end of the ladder (3) is now at a height at which it can be removed by unhooking the ladder (3) firstly from post (11) and then hook (7).

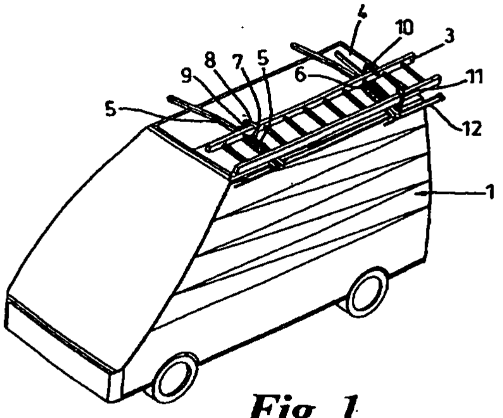

Fig. 1

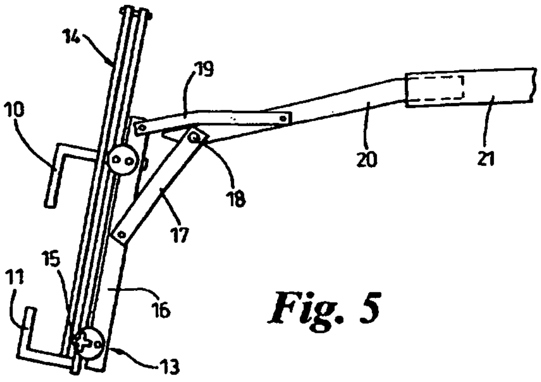

Fig. 5

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

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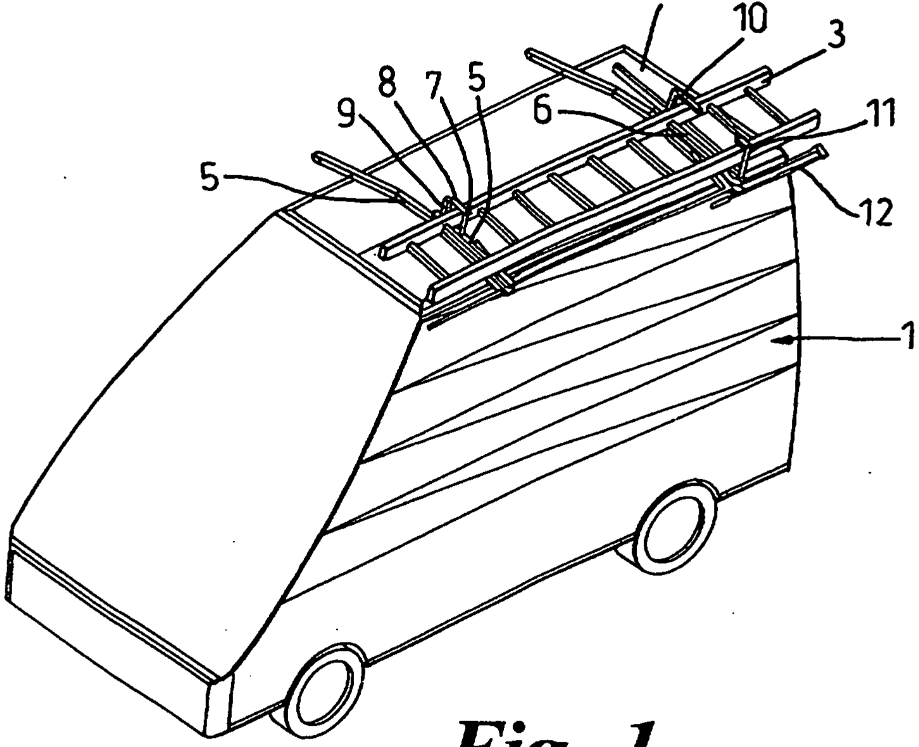

Fig. 1

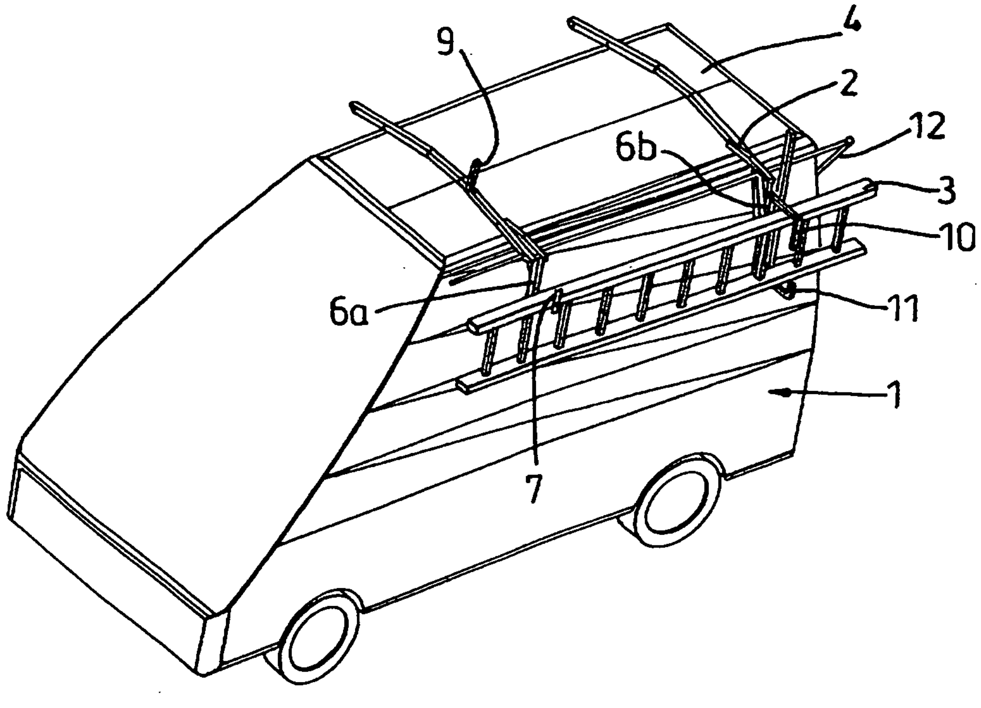

Fig. 2

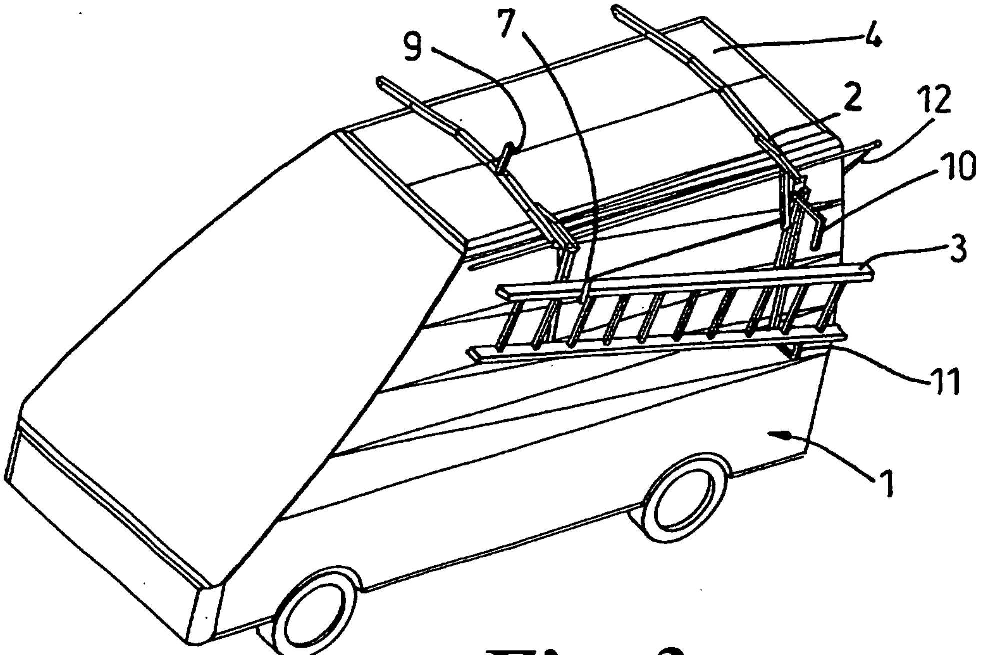

Fig. 3

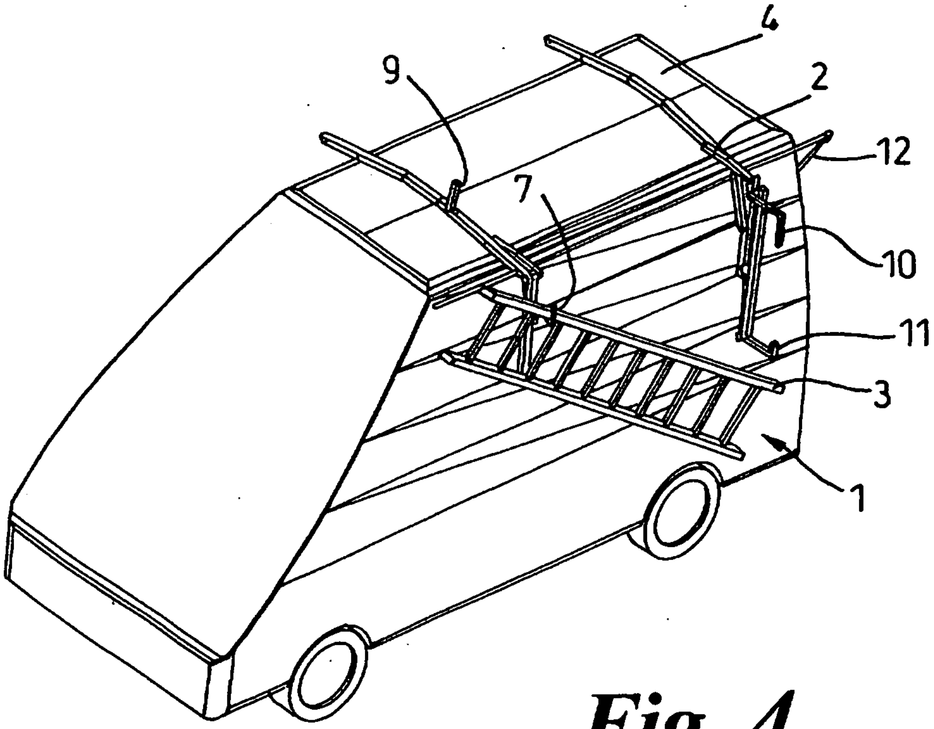

Fig. 4

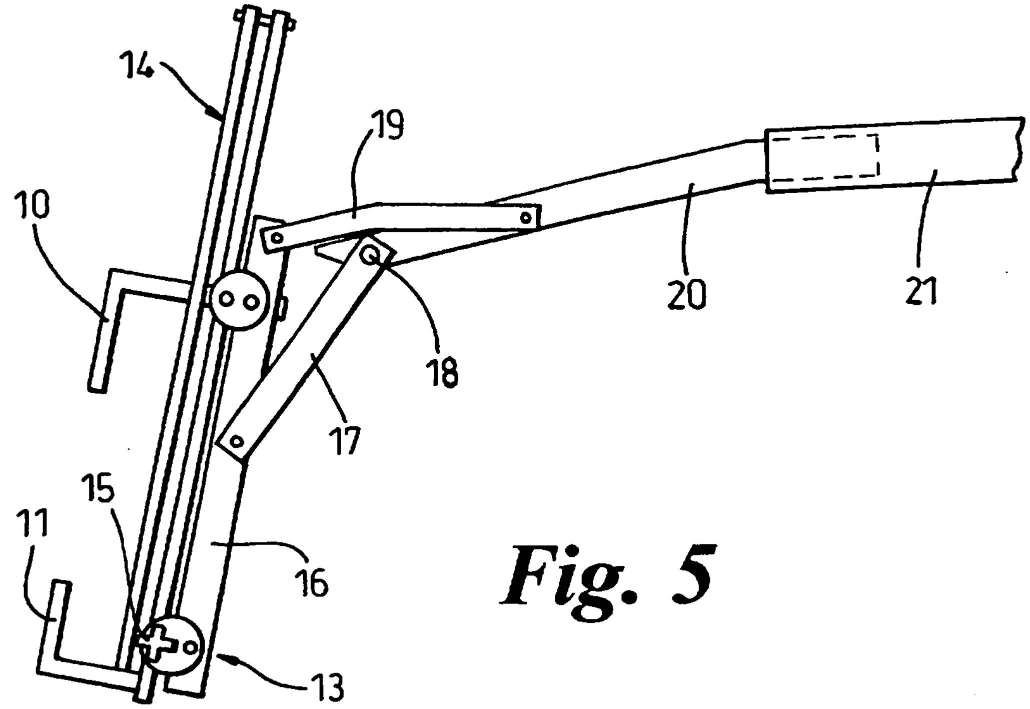

Fig. 5

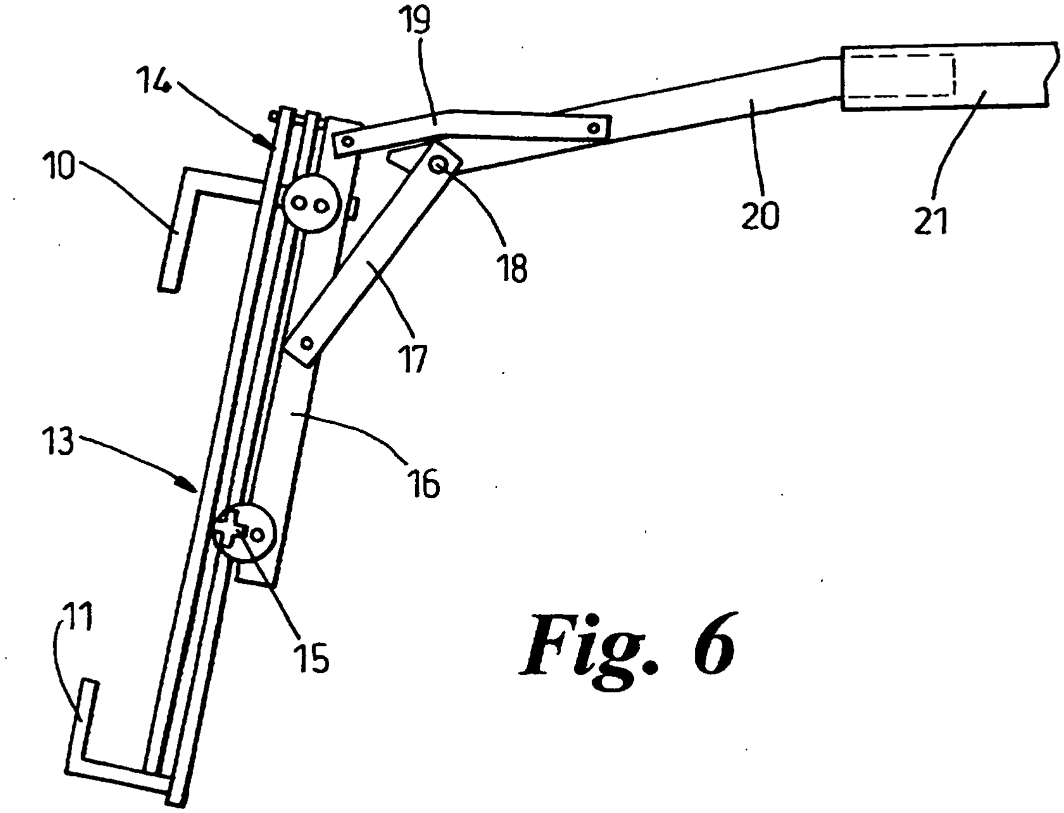

Fig. 6

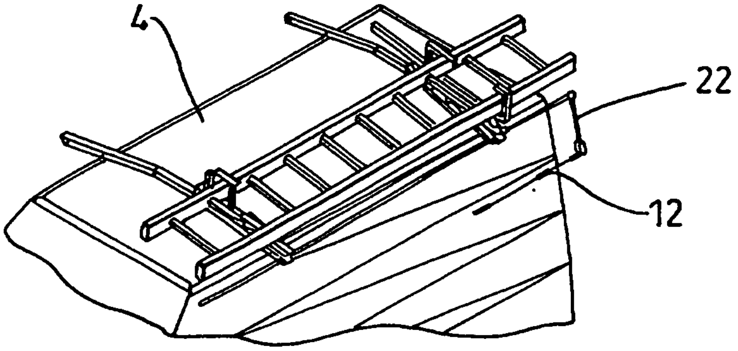

Fig. 7

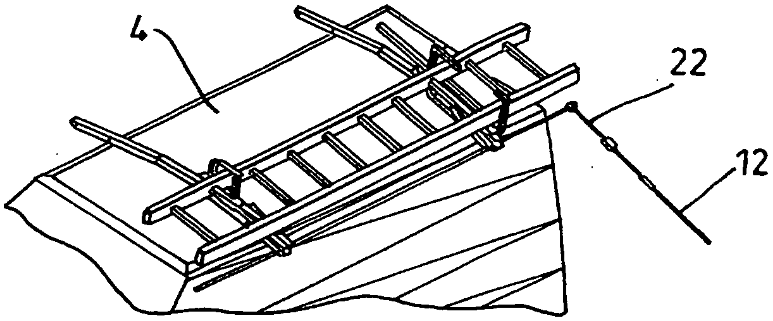

Fig. 8

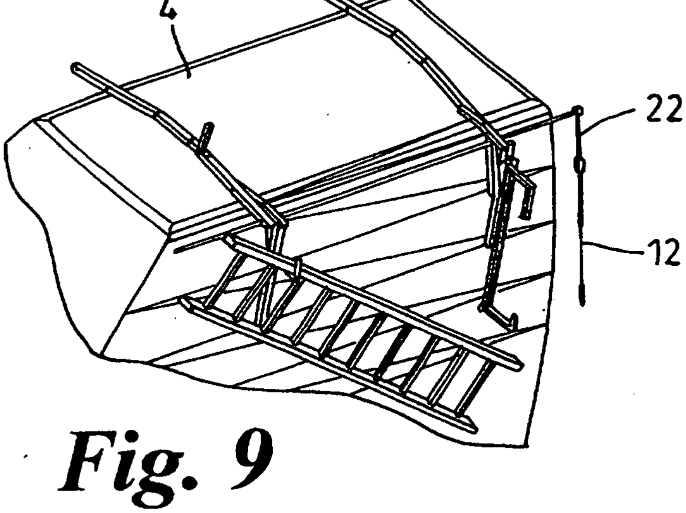

Fig. 9

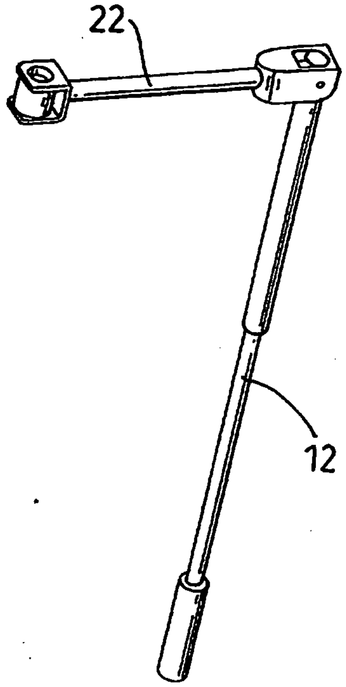

Fig. 10

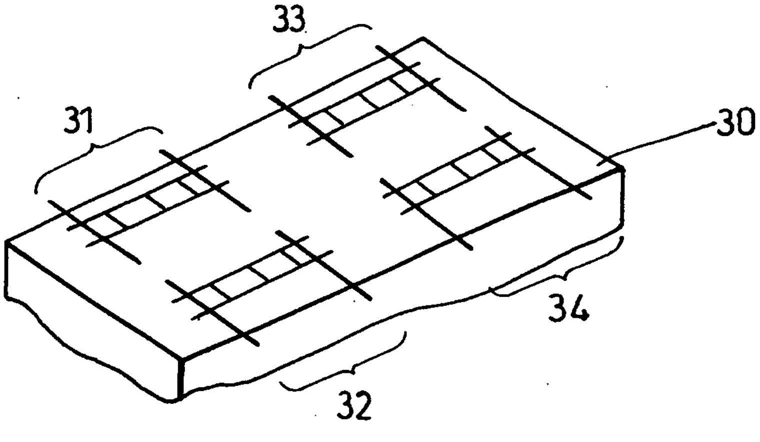

Fig. 11

A RACK FOR SUPPORTING OBJECTS

The present invention relates to a rack for supporting objects, and especially but not solely to a rack for supporting a ladder on a vehicle.

US Patent No. 5,297,912 describes a rack to hold a ladder on the roof of a vehicle, whereby the rack provides an arrangement to rotatably move the ladder to a position from which it can be removed readily by a person.

However, this rack mechanism is only suitable for vehicles whose roofs are below a given height, typically 1.9 metres, whereas many vans and commercial vehicles nowadays have roofs about 2.4 metres from the ground.

If this existing rack arrangement is used on such high-roofed vehicles, the operator is only able to unload (or load up) the ladder with assistance from other people and/or by him standing on a step-ladder. However, many vans and commercial vehicles have just a single driver-operator with no assistant accompanying him or her, and also use of a step-ladder increases the risks personal harm or injury especially when holding a large, cumbersome and heavy object such as a ladder.

The owner of US Patent Specification 5,297,912 has attempted to provide a rack arrangement which can be used with high-roofed vehicles but all attempts to modify the rack arrangement in that patent specification or to develop a wholly different rack arrangement have been unsuccessful.

Other suppliers of ladder racks have attempted to solve the same problem. For example, one attempt at a solution provides two sets of tubes spanning over a high-roof van and fixed to the gutters in the conventional way. These tubes act as guides for brackets on which a ladder is strapped.

However, the loading operation requires two people, each pulling the ladder off the roof with a handle and sliding it down the guides. If the operators do not act in unison, the ladder twists and jams in the guides. Weight-carrying depends entirely upon the strength of the operators. It also does not enable a ladder to be carried on both sides.

Attempts have been made to remove ladders from high roof vans by sliding them rearwardly over the back end of the van, but it is still necessary to release them from the rack, thereby requiring the operator to climb up to the roof. This risks injury to the operator, likewise as the ladder is being passed over the rear end of the van.

According to the present invention, there is provided a rack for storage of an elongate object at an inaccessible location, the rack comprising an assembly having at least one support for holding the object at the location along the length of the object, means to move the assembly with the object thereon away from the inaccessible location, and means to position the object to enable removal of the object from the rack.

The rack may comprise any one or more of the following features:-

- the positioning means comprises sliding means to transfer the object for removal from the rack.

- the positioning means operates on only one end of the elongate object.

- the positioning means comprises damping means on movement of the object to a position to a position for removal of the object from the rack.

- the damping means comprises pneumatic, hydraulic or mechanical means.

- means to place the object to a mounting position on the assembly.

- the placement means comprises sliding means.

- the placement means comprises pneumatic, hydraulic or mechanical means.

- the rack is located on a vehicle to hold an object on a high roof.

- a rack to hold a ladder on a high roof of a vehicle.

- two supports for holding the object at the inaccessible location along the length of the object.

- an assembly to hold an object on a high roof of a vehicle, means to move the assembly and the object away from the inaccessible location to a position wherein the object lies against a side of the vehicle with the length of the object generally horizontal.

The present invention also provides a vehicle with at least one rack as defined in the claims.

The present invention is not just applicable to racks for supporting ladders on the roofs of vehicles, but is also applicable to racks for supporting elongate objects, for example pipes, tubes or rods (e.g. construction materials, plumbing materials and so on) on vehicles.

The present invention is also applicable to racks to hold ladders (or other elongate objects for example as specified above), which racks are in inaccessible locations generally, for example on immobile structures (e.g. shelving or other storage units) rather than vehicles.

Thus the present invention provides a rack arrangement which allows a single operator to readily and safely load, or unload, ladders or other elongate objects.

Furthermore, the present invention enables two such racks to be provided, side by side on a vehicle roof, with one rack arranged to unload a ladder (or other elongate object) on one side of the vehicle, and the other rack arranged to unload it on the other side of the vehicle. Additionally or alternatively two or more racks may be provided lengthwise along the vehicle.

The present invention also provides a method for unloading or loading an object as defined in Claims 17 to 24 herein.

In order that the invention may more readily be understood, a description is now given, by way of example only, reference being made to the accompanying drawings in which:

Figure 1 is a perspective view of a ladder rack embodying the present invention in the transportation position on a van;

Figures 2 to 4 are views of the rack of Figure 1 in various stages of unloading the ladder;

Figure 5 and 6 are side views of the rack of Figure 1;

Figures 7 to 9 show stages in the unloading operation of a second embodiment of ladder rack;

Figure 10 shows the handle of the ladder rack of Figures 7 to 9; and

Figure 11 shows an arrangement of racks.

In Figure 1, there is shown a high-roof transit van 1 with a ladder rack 2 of the present invention in the position for transportation of a ladder 3. Thus, ladder 3 lies horizontally on top of roof 4 (which is approximately 2.4 metres from the ground) of van 1 supported on base 5 fixed to roof 4 and having front cross-bar 6a and rear cross-bar 6b.

Front cross-bar 6a has a hook 7 whose free end 8 is close to upright bar 9 in this position of the rack thereby to prevent unauthorised removal of ladder 3. Rear cross-bar 6b has two ladder posts 10 and 11 to retain ladder 3 in that location.

In order to remove ladder 3 from the position in Figure 1, handle 12 of rack 3 is pivoted outwards and is then ratcheted upwards, causing the moveable parts of rack 2 (while still holding ladder 3) swinging outwards until it reaches the position shown in Figure 2 where it lies against the side of van 1 with the length of ladder still being horizontal after rotation through 90°.

Then the operator releases a lock 13 (see Figure 5 and 6) allowing post 11 to move vertically downwards relative to post 10 and hence still supporting ladder 3 until the position shown in Figure 3.

At this stage, the lower end of ladder 3 is now at a height at which it can be removed comfortably and readily by a person of normal height without risk of personal harm or injury, this being accomplished by unhooking ladder 3 firstly from post 11 (See Figure 4) and thereafter hook 7.

In order to load ladder 3 onto the roof 4 of van 1, the sequence of actions is repeated in reverse order.

Thus, the present invention enables a single person to readily, easily and safely unload or load up a ladder on a high-roofed van or other vehicle.

Further details of the moveable elements of rack 2 are shown in Figures 5 and 6 which correspond to the positions of Figures 3 and 4 respectively.

Thus rack 2 has a sliding rail 14 connected to post 11, which rail 14 is slidable relative to post 10 upon release of lock 13 by use of bar tension handle 15 when rack 2 is in position of Figure 2. Thus, post 11 is moved until it reaches the position as shown in Figure 6.

In the illustrated embodiment, the sliding rail is the rear post. In an alternative, hook 7 is the sliding rail. In another alternative, both hook 7 and post 11 are slidable downwards, so that either or both can be moved downwards as appropriate; this arrangement is particularly advantageous when used for transport of a tubular container holding e.g. elongate pipes rather than ladders, so that the container can readily be maintained substantially horizontal at all times in order to prevent the pipes in the container from sliding out.

Rack 2 also has a rotation arm 16, a drive arm 17, a drive shaft 18, a cranked trailing arm 19, a half bar 20 and a sleeve 21 (the latter connecting to handle 12) which provide the rotational movement required between the positions in Figures 1 and 2.

Figures 7 to 10 relate to an alternative embodiment wherein the ratchet and handle arrangement has an intermediate extension arm 22 to make it even easier for the operator to readily grasp and turn or otherwise operate the mechanism.

In a variant to either of the above described embodiments, downward movement of the post 11 and rail 14 may be damped by any appropriate means, for example by pneumatic (e.g. compressed air), hydraulic, or mechanical means (e.g. ratchet operation) or by electric motor.

Additionally or alternatively, during the loading operation of the ladder 3, the upward movement of the post 11 and rail 14 may be accomplished by any appropriate means, for example by pneumatic, hydraulic or mechanical means (e.g. ratchet operation) or by electric motor.

In the embodiment shown schematically in Figure 11, the high roof 30 of a van has two racks 31, 32 which are side by side at the front of the roof and two further racks 33 and 34 at the back of the roof and in line with respective racks 31, 32.

While embodiments have been described by reference to a rack for a ladder, the rack of the present invention can be used to load and/or unload any appropriate elongate object (e.g. pipes, tubes or rods) whether on vehicles or immobile structures, for storage in inaccessible positions. The inaccessible position need not be at a particularly high place on an immobile structure, but can be at a particularly low place on an immobile structure.

CLAIMS

1. A rack for storage of an elongate object at an inaccessible location, the rack comprising an assembly having at least one support for holding the object at the location along the length of the object, means to move the assembly with the object thereon away from the inaccessible location, and means to position the object to enable removal of the object from the rack.

2. A rack according to Claim 1 wherein the positioning means comprises sliding means to transfer the object for removal from the rack.

3. A rack according to Claim 1 or 2 wherein the positioning means operates on only one end of the elongate object.

4. A rack according to Claim 1 or 2 wherein the positioning means comprises damping means on movement of the object to a position for removal of the object from the rack.

5. A rack according to Claim 4, wherein the damping means comprises pneumatic, hydraulic or mechanical means.

6. A rack according to any preceding claims comprising means to place the object at a mounting position on the assembly.

7. A rack according to Claim 6 wherein the placement means comprises sliding means.

8. A rack assembly according to Claim 6 or 7 wherein the placement means comprises pneumatic, hydraulic or mechanical means.

9. A rack assembly according to any preceding claim, wherein the rack is located on a vehicle to hold an object on a high roof.

10. A rack assembly according to Claim 9 comprising a rack to hold a ladder on a high roof of a vehicle.

11. A rack according to any preceding claim comprising two supports for holding the object at the inaccessible location along the length of the object.

12. A rack according to any preceding claim comprising an assembly to hold an object on a high roof of a vehicle, means to move the assembly and the object away from the inaccessible location to a position wherein the object lies against a side of the vehicle with the length of the object generally horizontal.

13. A rack substantially as hereinbefore described, with reference to/and as illustrated in, any one or more of the Figures of the accompanying drawings.

14. A vehicle having a rack according to any preceding claim.

15. A vehicle with a high roof having a rack according to any of Claims 1 to 13.

16. A vehicle with a high roof comprising a plurality of racks side by side, and/or end to end along the length of the vehicle.

17. A method of unloading an object held on a rack comprising an assembly having at least one support for holding an object at an

inaccessible location, the method comprising moving the assembly with the object thereon away from the inaccessible location, and then positioning the object to enable removal of the object from the rack.

18. A method according to Claim 17 comprising rotating the assembly and the object away from the inaccessible location to a position wherein the object lies against a side of the vehicle with the length of the object generally horizontal.

19. A method according to Claim 17 or 18 comprising sliding the object to enable removal of the object from the rack.

20. A method according to any of Claims 17 to 19 comprising unloading a ladder from a high roof of a vehicle.

21. A method of loading an object to be held on a rack comprising an assembly having at least one support for holding an object at an inaccessible location, the method comprising engaging the object on the rack, and then moving the assembly with the object thereon to the inaccessible location.

22. A method according to Claim 21 comprising sliding the object from the position of engagement.

23. A method according to Claim 21 or 22 comprising rotating the assembly and the object from a position wherein the object lies against a side of the vehicle with the length of the object generally horizontal, to the inaccessible location.

24. A method according to any of Claims 21 to 23 comprising loading a ladder onto a high roof of a vehicle.

25. A method of unloading/loading an object substantially as hereinbefore described with reference to, and/or as illustrated in, any one or more Figures of the accompanying drawings.

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Application No:	GB 0007312.2	**Examiner:**	Kevin Hewitt
Claims searched:	1-15 & 17-25	**Date of search:**	21 June 2001

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.S): B7J (J64)

Int Cl (Ed.7): B60R 9/00, 9/04, 9/042

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB 2251837 A	(ZIAYLEK) See all Figs.	1,2,4-12, 14,15,17, 21
X	GB 2177055 A	(LUTHER) See all Figs.	1,2,6-9, 12,14,15
X	EP 0287269 A1	(BRITISH GAS) See all Figs.	1,2,6,7, 9-12,14, 15
X	US 5884824 A	(SPRING, Jr.) See all Figs.	1-7,9-11, 14,15,17, 21
X	US 5850891 A	(OLMS et al.) See all Figs.	1-12,14, 15, 17-24
X	US 5398778 A	(SEXTON) See all Figs.	1,2,4-12, 14,15,17, 21

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
		E	Patent document published on or after, but with priority date earlier than, the filing date of this application.
&	Member of the same patent family		

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